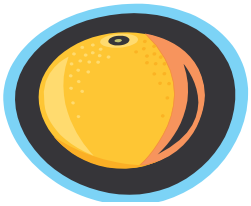
Science Update

Beneficial Bacteria Battle Fire Blight

After screening more than 1,000 candidate control microbes, researchers settled on strain E325 of *Pantoea agglomerans* as a promising biological agent to curb spread of fire blight, a costly disease in apples, pears, and other tree fruit. The natural, blossom-dwelling *P. agglomerans* was found to handily outcompete *Erwinia amylovora,* the bacterium that causes fire blight. *P. agglomerans* deprives *E. amylovora* of adequate nutrients and space for survival, reducing its capacity to cause harm in infected trees.



Following the end of a cooperative research and development agreement, work continues with Northwest Agricultural Products, Inc., of Pasco, Washington, to commercially develop this fire blight-fighting strain of *P. agglomerans*.

The company has filed with the U.S. Environmental Protection Agency for approval for its use. Meanwhile, growers continue to rely on pruning, cultural practices, and antibiotic sprays such as streptomycin to hold fire blight in check. *P. Lawrence Pusey, USDA-ARS Tree Fruit Research Laboratory, Wenatchee, Washington; phone (509) 664-2280, e-mail pusey@tfrl.ars.usda.gov.*

B_{12} Shortfall's Bad for Bone Density

While women are about four times more likely than men to develop weak, porous, osteoporotic bones, men can also suffer a decline in bone strength over time. A recent study has linked low bone mineral density in both men and women with vitamin B_{12} deficiency, although the mechanism behind the relationship isn't fully understood. The researchers examined vitamin B_{12} status and indicators of bone health in 2,576 men and women aged 30 to 87 who are participating in the Framingham Osteoporosis Study.

Participants with plasma levels of vitamin B_{12} below 148 picomoles per liter (pM/L) were found to be at greater risk for developing osteoporosis than those with higher levels. Some experts consider plasma B_{12} levels below 185 pM/L to be "very low."

The recommended daily allowance for vitamin B_{12} is currently set at 2.4 micrograms for both men and women. Animal-based foods such as fish, beef, pork, milk, and cheese are generally good sources. But because B_{12} is often not well absorbed by older persons, those above age 50 are encouraged to consume fortified foods or take B_{12} supplements. *Katherine L. Tucker, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, Massachusetts; phone (617) 556-3351, e-mail katherine.tucker@tufts.edu.*

Sweet, Versatile Mannitol From Microbial Fermentation

Mannitol is a minty-tasting ingredient found in many foods and even in chewing gum. It's a sugar alcohol made by some plants and algae but is produced largely by chemical means.

Soon, if agricultural researchers have their way, commercial mannitol production will be done by feeding high-fructose corn syrup to bacteria known as *Lactobacillus intermedius*. After a few hours in a deep-tank fermentor, the bacteria can convert 72 percent of the sugar into mannitol.

Food processors use mannitol as a bodying agent, preservative, and diabetic-friendly sweetener, but it also has medical and pharmaceutical uses. Current production—which relies on exposing fructose and glucose to a nickel catalyst and high-pressure hydrogenation—is time-consuming, produces chemical wastes, and converts only about 25 percent of the sugars to mannitol.

The patented microbial conversion method, which uses powerful natural enzymes, is far more efficient and can be used with sucrose and other sugars. Work is under way with zuChem, Inc., of Chicago, Illinois, to scale-up and refine this approach. *Badal C. Saha, USDA-ARS Fermentation Biotechnology Research Unit, Peoria, Illinois; phone (309) 681-6276, e-mail sahabc@ncaur.usda.gov.*

Wheat Fungus Tapped for Sequencing

A microbe that causes lesions in wheat leaves that interfere with the plant's growth and grain formation has been selected by the U.S. Department of Energy's Joint Genome Institute for genetic sequencing. *Mycosphaerella graminicola,* one of the top five wheat disease pathogens around the world, belongs to a family of fungi that cause similar leaf-spotting diseases in bananas, strawberries, cereal crops, citrus, and many other plants.

The fungus costs U.S. wheat farmers about $275 million a year in yield losses. European counterparts spend more than $600 million annually on fungicidal sprays.

Researchers have already assembled a genetic map with more than 300 gene markers for *M. graminicola*. In cooperation with Plant Research International in Wageningen, The Netherlands, and aided by the Joint Genome Institute's equipment and expertise, they expect to complete sequencing of the entire genome soon.

Understanding the functions of *M. graminicola's* approximately 15,000 genes will help scientists learn how this fungus infects crops and devise ways to better control it and related species. *Stephen B. Goodwin, USDA-ARS Crop Production and Pest Control Research Unit, West Lafayette, Indiana; phone (765) 494-4635, e-mail sgoodwin@purdue.edu.*